

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

2x2 802.11a/b/g/n +BT Module (SiP)

MODEL NUMBER: QCA6234

FCC ID: PPD-QCA6234 IC: 4104A-QCA6234

REPORT NUMBER: 13U14995-1

ISSUE DATE: JULY 1, 2013

Prepared for QUALCOMM ATHEROS, INC. 1700 TECHNOLOGY DRIVE SAN JOSE, CA 95110

Prepared by UL VERIFICATION SERVICES INC. 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

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Revision History

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FCC ID: PPD-QCA6234	IC: 4104A-QCA6234
11. SETUP PHOTOS	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	QUALCOMM ATHEROS, INC 1700 TECHNOLOGY DRIVE SAN JOSE, CA 95100
EUT DESCRIPTION:	2x2 802.11a/b/g/n +BT Module (SiP)
MODEL:	QCA6234
SERIAL NUMBER:	75720088, 75720080
DATE TESTED:	April 19 - May 24, 2013

APPLICABLE STANDARDS						
STANDARD	TEST RESULTS					
CFR 47 Part 15 Subpart C	Pass					
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass					
INDUSTRY CANADA RSS-GEN Issue 3	Pass					

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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FRANK IBRAHIM WISE PROGRAM MANAGER UL Verification Services Inc.

Tested By:

TONY WAGONER EMC ENGINEER UL Verification Services Inc.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is 2x2 802.11a/b/g/n +BT Module (SiP).

Three board variants are provided, no filter version, 3G filter version and LTE filter version. Test was done to worst case among the three boards.

The radio module is manufactured by Qualcomm Atheros, Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

2400 - 2483.5 MHz Authorized Frequency Band							
Frequency	Mode	Power	Power	Total	Total		
Range (MHz)		Chain 0	Chain 1	power	power		
		(dBm)	(dBm)	(dBm)	(mW)		
2412 - 2462	802.11b CDD 2TX	20.67	19.62	23.19	208.30		
2412 - 2462	802.11g Legacy 2TX	26.30	25.36	28.87	770.14		
2412 - 2462	802.11n HT20 CDD 2TX	25.78	24.76	28.31	677.67		
5725 - 5850 M	Hz Authorized Frequency Ba	nd					
Frequency	Mode	Power	Power	Total	Total		
Range (MHz)		Chain 0	Chain 1	power	power		
		(dBm)	(dBm)	(dBm)	(mW)		
5745 - 5825	802.11a CDD 2TX	20.92	22.11	24.57	286.15		
5745 - 5825	802.11n HT20 CDD 2TX	22.43	22.41	25.43	349.17		
5755 - 5795	802.11n HT40 CDD 2TX	22.45	23.33	25.92	391.07		

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The declared antenna gain is 2dBi, this antenna gain was used for conducted spurious/bandedge calculations.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was ART2-GUI version 2.3, CART version 4.4

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

A baseline scan was performed on various data rates for 11b and 11g modes, it was found that when Peak detector was used for the test item the highest data rate was worst-case, and when the AVG detector was chosen for a certain test item the lowest data rate was worst-case, and since the items with AVG detector had lower margin and they were more critical, lowest data rates, as follows, were selected for performing the final measurements:

802.11b mode: 1 Mbps 802.11g mode: 6 Mbps 802.11a mode: 6 Mbps 802.11n HT20mode: MCS0 802.11n HT40mode: MCS0

Three board variants are provided, no filter version, 3G filter version and LTE filter version. Test was done to worst case among the three boards.

Protocol used for spurious and harmonics was conducted measurements + cabinet radiated emissions with 50 ohm load.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List						
Description Manufacturer Model Serial Number FCC ID						
Laptop	Lenovo	T410 Thinkpad	R8-V8D76 11/03	DoC		
SD Card Express Adapter	Bplus	EC230	1100319	N/A		

I/O CABLES

Cable	Port	# of identical	Connector	Cable Type	Cable	Remarks
No		ports	Туре		Length (m)	
1	AC	1	AC Adapter	Un-Shielded	1m	NA
2	DC	1	DC	Un-Shielded	1.5m	NA
3	AC	1	AC Adapter	Un-Shielded	1m	NA

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List							
Description	Manufacturer	Model	Asset/	Cal Date	Cal Due		
			T number				
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/12	12/20/13		
Spectrum Analyzer	Agilent	N9030A	T313	02/22/13	02/22/14		
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	02/26/13	02/26/14		
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	05/07/13	05/07/14		
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	T243	03/06/13	03/06/14		
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/13	02/13/14		
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/12	12/11/13		
Horn Antenna, 1-18GHz	ETS Lindgren	3117	T344	02/19/13	02/19/14		
Horn Antenna, 1-18GHz	ETS Lindgren	3117	T345	02/19/13	02/19/14		
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13		
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/14/11	06/14/13		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/13	01/28/14		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	03/23/13	03/23/14		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/12	10/22/13		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/19/12	10/19/13		
PreAmplifier, 1-26.5GHz	Agilent	8449B	T402	03/23/13	03/23/14		
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/11	08/02/13		
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13		
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12	12/13/13		
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14		
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	08/08/12	08/08/13		

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7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/T
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
802.11b	12.170	12.240	0.994	0.994	0.000	0.010
802.11g	2.025	2.085	0.971	0.971	0.127	0.494
802.11n HT20, 2.4 GHz band	1.887	1.947	0.969	0.969	0.136	0.530
802.11a	2.026	2.061	0.983	0.983	0.000	0.010
802.11n HT20, 5.8 GHz band	1.887	1.923	0.981	0.981	0.000	0.010
802.11n HT40, 5.8 GHz band	0.127	0.162	0.782	0.782	1.067	7.886

7.2. MEASUREMENT METHOD

6 dB BW: KDB 558074 D01 v03r01, Section 8.1.

Output Power: KDB 558074 D01 v03r01, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r01, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r01, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r01, Sections 12.1. and 12.2.

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7.3. 2.4 GHz DUTY CYCLE PLOTS

of 30 dB	m	#Atten 30	dB			∆ Mk	r2 12.1	17 ms BdB	Center Freq
Peak	<u>&</u>	#Atten Jo					-0.0	<u> </u>	2.41200000 GHz
.og 0 B/)ffst									Start Freq 2.41200000 GHz
0.5 IB									Stop Freq 2.41200000 GHz
.gAv –									CF Ste 8.0000000 MHz <u>Auto M</u> a
enter 2.	412 000 G	Hz					Spa	n 0 Hz	
tes BW 8	MHz		#VBW 8	MHz	Sweep	14.07 m	s (1001	pts)	0.00000000 Hz
Marker	Trace	Type Time		X Axis			Amplitu	ide 👘	
1.4	(1)	Time		ото.е µs 12.24 ms			0.53 d	в	Cine al Tra al I
2R	ú	Time	:	886.2 ця			21.18 dE	- Im	Signal Track
2 <u>∆</u>	(1)	Time		12.17 ms			-0.03 d	B	0n <u>0</u>



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Adriei Valiei	11 14.30.10	101ay 13, 201	J			4 M	r س 10	07 mo	
Ref 30 dB	m	#Atten 30 d	в			ΔIVII	2.1	23 dB	Center Freq
#Peak 📘									2.43700000 GHz
Log C	of white	and the sheet of the			and the second			A MIC WIN	Start Frag
18/ L									2 4370000 GHz
)ffst									2. 10/ 00000 0112
0.5									Stop Frod
IB	W					<u> </u>			2.43700000 GHz
									CF Step
									8.00000000 MHz
-9~• L									<u>Auto Ma</u>
Center 2.4	37 000 GHz	2					Spa	an 0 Hz	Fred Offset
Res BW 8	MHz		#VBW 50 N	/Hz	Sw	еер З і	ns (1001	pts)	0.00000000 Hz
Marker	Trace	Туре Тіта	×	Axis			Amplit	ude	
14	(1)	Time	1.	зоцз 947 ms			20.00 0	18	
2R	(Ť)	Time		390 µs			19.28 di	9m	Signal frack
2∆	(1)	Time	1.	887 ms			2.23 (18	0n <u>01</u>

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7.4. 5.8 GHz DUTY CYCLE PLOTS

Ref 30 dBn	n	Atten 20 (IB			۵ Mk	r2 2.0: -0.7	26 ms '6 dB	Center Freq
#Peak		A					ليتعادر معام	2	5.18000000 GHz
Log	28					······································			Start Freq 5.18000000 GHz
25.5 IB									Stop Freq 5.18000000 GHz
≠PAvg									CF Step 8.0000000 MHz <u>Auto Ma</u>
Center 5.18	80 000 GH	z					Spa	n 0 Hz	
Res BW 8 I	MHz		#VBW 8	MHz	Swee	ep 2.38 i	ms (606	pts)	
Мањег 1R 1 <u>∆</u> 2R 2 <u>∆</u>	Trace (1) (1) (1) (1)	Type Time Time Time Time	:	X Axis 150.3 μs 2.061 ms 184.9 μs 2.026 ms			Amplit 19.92 df -0.29 df 20.39 df -0.76 d	ude 9m 8 9m 8	Signal Track



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					A Mkr2	126	 В us	
tef 25 d	Bm	#Atten 20 dB			H 10102	2.7	/8 dB	Center Freq 5.19000000 GHz
og					WHITE AND A			
0 B/ -								Start Freq 5.19000000 GHz
1.5 B								Stop Freq 5.1900000 GHz
		uehalee		17			TAT WATER	
.gAv ⊨								CF Ste 8.00000000 MHz Auto Mi
L enter 5	5.190 000 GH					Spa	n 0 Hz	
es BW	8 MHz	;	∜VBW 50 MHz	Swee	р 420 µs (1001	ots)	
Marker	Trace	Туре	X Axis		,	Amplitu	de	5.56556666 THE
1Δ	(1)	Time	55.86 μs 162.1 μs		11	1.32 d	в	Signal Track
2R	(1)	Time	91.14 μs		ç	9.43 dB	m	
2∆	(1)	Time	126.8 µs			2.78 d	B	<u> </u>

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8. ANTENNA PORT TEST RESULTS 8.1. 802.11b MODE IN THE 2.4 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain 0	Chain 1	Limit
	(MHz)	(MHz)	(MHz)	(MHz)
Low	2412	7.223	7.205	0.5
Low	2417	7.187	7.205	0.5
Mid	2437	7.223	7.220	0.5
High	2457	7.205	7.205	0.5
High	2462	7.223	7.205	0.5

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6 dB BANDWIDTH, Chain 1



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8.1.2. 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

RESULTS

Channel	hannel Frequency		99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	2412	12.4602	12.3436
Low	2417	12.4462	12.2834
Mid	2437	12.4974	12.2287
High	2457	12.6931	12.3118
High	2462	12.3501	11.9920

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99% BANDWIDTH, Chain 1



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8.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 14.88 dB (including 10 dB pad, power splitter 3.4 dB, and 1.48 cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	2412	17.80	17.60	20.71
Low	2417	18.00	18.10	21.06
Mid	2437	18.70	17.80	21.28
High	2457	17.70	16.70	20.24
High	2462	18.50	17.40	21.00

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8.1.4. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.00	2.00	2.00

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Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	2.00	30.00	30	36	30.00
Low	2417	2.00	30.00	30	36	30.00
Mid	2437	2.00	30.00	30	36	30.00
High	2457	2.00	30.00	30	36	30.00
High	2462	2.00	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margin
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	20.05	20.21	23.14	30.00	-6.86
Low	2417	19.71	19.84	22.79	30.00	-7.21
Mid	2437	20.67	19.62	23.19	30.00	-6.81
High	2457	20.35	19.40	22.91	30.00	-7.09
High	2462	20.08	18.92	22.55	30.00	-7.45

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		L KALud	7 005 MU-	
ef 30 dBm	Atten 30 dB	 Band Pwr 1	7.205 MHz 8.92 dBm	Center Freq 2.46200000 GHz
og) B/ 1R			1	Start Freq 2.45750000 GHz
ffst I.9 B			-	Stop Freq 2.46650000 GHz
Avg				CF Ste 900.000000 kHz <u>Auto M</u>
1 S2 3 FC AA				Freq Offset 0.00000000 Hz
f): Tun wp				Signal Track On <u>O</u>
enter 2.462 000 (GHz #VPW 1	 	Span 9 MHz	

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8.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

<u>RESULTS</u>

PSD Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Meas	Meas	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	-3.42	-3.31	-0.35	8.0	-8.4
Low	2417	-4.03	-3.63	-0.82	8.0	-8.8
Mid	2437	-2.84	-3.85	-0.31	8.0	-8.3
High	2457	-2.88	-4.00	-0.39	8.0	-8.4
High	2462	-3.38	-4.66	-0.96	8.0	-9.0

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PSD, Chain 0





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PSD, Chain 1



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8.1.6. OUT-OF-BAND EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

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IN-BAND REFERENCE LEVEL, Chain 0



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tef 30 dBn Peak	n	Atten 30	dB				Mkr	2 24.98 -36.25	7 GHz dBm	Center Freq 13.0150000 GHz
og 0 B/										Start Freq 30.000000 MHz
4.9 B									2	Stop Freq 26.000000 GHz
7.6 Bm 4.4 gAv			********	•••••						CF Stej 2.59700000 GHz <u>Auto M</u> a
tart 30 Mi Res BW 1	lz 00 kHz		#VBW	300 k	Hz	Swee	Sto p 2.482 :	p 26.00 s (2001	0 GHz pts)	Freq Offset
Marker 1 2	Trace (1) (1)	Type Freq Freq		X A 1.23(24.987	ixis B GHz 7 GHz			Amplitu -46.49 dB -36.25 dB	ude Im Im	Signal Track

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LOW CHANNEL BANDEDGE, Chain 1



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HIGH CHANNEL BANDEDGE, Chain 1



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OUT-OF-BAND EMISSIONS, Chain 1



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						Mkr	2 25.02	6 GHz	
Ref30 dBı #Peak ∣	m	Atten 30 d	B				-36.07	dBm	Center ⊢req 13.0150000 GHz
Log 10 dB/ Offst									Start Freq 30.000000 MHz
14.9 dB DI	1							2	Stop Freq 26.000000 GHz
.10.0 dBm	Q	- Andrew Marker							CF Ste
LgAv —									2.59700000 GHz <u>Auto Ma</u>
L Start 30 M #Res BW 1	Hz 100 kHz		#VBW 300	kHz	Swee	Sto p 2.482 :	p 26.00 s (2001	0 GHz pts)	Freq Offset
Marker	Trace	Туре	>	(Axis			Amplite	ıde	0.0000000 Hz
2	(1)	Freq Freq	1.4 25.0	238 GHZ 126 GHZ			-40.97 dB -36.07 dB	m	Signal Track On <u>O</u> f



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REPORT NO: 13U14995-1 FCC ID: PPD-QCA6234

8.1.7. CONDUCTED BE AND SPURIOUS IN RESTRICTED BANDS (no filter unit)

RESTRICTED BANDEDGE

<u>Chain 0</u>



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- Agrent 05.10.24	rip: 20, 2010			15 1	
ef 20 dBm	Atten 10 dB		Mkr1 2	.390 00 GHz 52.853 dBm	Center Fred 2.35000000 GH
)g]/]/					Start Fred 2.31000000 GH
.9					Stop Fre 2.39000000 GH
2Avg					CF Ste 8.00000000 MH <u>Auto N</u>
SZ FS AA 0:				******	Freq Offsel
vp					Signal Trac On <u>(</u>
art 2.310 00 GHz			Stop 2	.390 00 GHz	



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🔆 Agilent 09:26:	07 Apr 25, 2013	_		RΤ	Freq/Channel
Ref20dBm ∉Avg	Atten 10 dB		Mkr1 2.44	83 830 0 GHz 49.718 dBm	Center Freq 2.49175000 GHz
_og 0 B/					Start Freq 2.48350000 GHz
20.9 1B					Stop Freq 2.5000000 GHz
¢PA∨g					CF Step 1.6500000 MHz <u>Auto Ma</u>
/1 S2 53 FS AA					Freq Offset 0.00000000 Hz
ı(f): -Tun Swp					Signal Track On <u>Of</u>
Start 2.483 500 0 (Res BW 1 MHz	GHz #VB	W 3 MHz	Stop 2.50 Sweep 1	00 000 0 GHz ms (601 pts)	



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. Agricit 10.10.00	- mpi zz, 2010				
ef7.1 dBm	#Atten 10 dB		Mkr1 2.48	6 387 5 GHz -49.741 dBm	Center Freq 2.49175000 GHz
9g					Start Freq 2.48350000 GHz
.1 3					Stop Freq 2.5000000 GHz
Avg	1				CF Ste 1.6500000 MHz <u>Auto M</u> :
1 S2 FS AA		and the second sec	*****	*****	Freq Offset 0.00000000 Hz
): Гип мр					Signal Track On <u>O</u>
art 2.483 500 0 GI	lz #VB\	N 3 MH ₇	Stop 2.50	0 000 0 GHz	

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LOW CHANNEL 2412, PEAK 🔆 Agilent 12:24:52 Apr 22, 2013 Freq/Channel R Т Mkr1 2.388 40 GHz Center Freq Ref 10 dBm #Atten 10 dB 40.79 dBm 2.35000000 GHz #Peak Log 10 Start Freq dB/ 2.31000000 GHz Offst 11.1 Stop Freq dB 2.39000000 GHz CF Step 8.00000000 MHz #PAvq Auto Man V1 S2 Freq Offset \$3 FC 0.00000000 Hz AA ⊐(f): Signal Track FTun On <u>Off</u> Swp Start 2.310 00 GHz Stop 2.390 00 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)



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			Mbr4 0	200 72 CU-	
ef 20 dBm Peak	Atten 10 dB		MKT1 2.	43.11 dBm	Center Freq 2.35000000 GHz
og) B/					Start Freq 2.31000000 GHz
пят).9 В					Stop Freq 2.39000000 GHz
PAvg					CF Step 8.00000000 MHz <u>Auto M</u> a
1 S2 3 FCurry-Marson Julian AA	ala an	-	water warman	- warden and	Freq Offset 0.00000000 Hz
f): Fun wp					Signal Track On <u>Of</u>
tart 2.310 00 GHz Res BW 1 MHz		SW 3 MH7	Stop 2.	390 00 GHz	



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			Mbr1 2.4	94 215 0 CHz	
ef 20 dBm	Atten 10 dB		WIKIT 2.44	43.24 dBm	Center Freq 2.49175000 GHz
g					
×/					Start Freq 2.48350000 GHz
fst .9					
					2.5000000 GH:
					CF Ste
Avg					<u>Auto M</u>
S2 Mandle Martin	man and man	under ten der geberger	ener manager and the second	manun	Freq Offset
AA					0.0000000 Hz
): 'un					Signal Tracl
vp					<u>On <u>C</u></u>
art 2 483 500 0 GH	7		Stop 2 5(0.000.0.GHz	
an 2.403 500 0 GH	2	#VRW 3 MHz	Swoon 1	me (601 nte)	



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-			Mbr1 2.49	7 597 5 64-	
f 10_dBm	#Atten 10 dB		WINT 2.40	42.26 dBm	Center Fred
eak a					2.40 11 0000 011
/					Start Frec 2.48350000 GH:
st 1					
					Stop Free 2.5000000 GH:
	1				CF Ste
Avg mmmmmm	men un man and	manan bernander	Marchine Adverse		1.65000000 MH <u>Auto M</u>
S2					Freq Offset
AA					0.00000000 Hz
:					Signal Tracl
/p					On <u>(</u>
ut 2 483 500 0 G			Stop 2 50	000.0 GHz	
oc BW 1 MHz	#		Sween 1	ne (601 nte)	



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Chain 0





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	····		Mkr1 7.234	1735 0 GHz	
f7.1 dBm ∨g	#Atten 6 dB			50.135 dBm	Center Fre 7.23473333 GH
g					Start Fre∉ 7.23423333 GH
.1					Stop Fre 7.23523333 G⊦
Avg		÷			CF St 2.41200000 GH Auto 1
1 S2 FS AA					Freq Offse 0.00000000 н
): un vp					Signal Trac On
nter 7.234 733 3 es BW 1 MHz	3 GHz #VB		Sweep 1 r	Span 1 MHz	



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Agrient 12.00.	13 Api 24, 2013		ML 4 4 9	20.475.0.01	
ef 20 dBm Avg	Atten 10 dB		MKr1 4.8	30 475 0 GHz -56.913 dBm	Center Freq 4.83000000 GHz
og 0 B/					Start Freq 4.82950000 GHz
B					Stop Freq 4.83050000 GHz
PAvg					CF Ste 100.000000 kHz <u>Auto M</u> :
/1 S2 3 FS AA					Freq Offset 0.00000000 Hz
f): Tun wp		<u></u>			Signal Track
enter 4.830 000 0	GHz #\/	BW 3 MH7	Sweep 1	Span 1 MHz	



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ж Agi	ient 14	.07:53 7	4pr 20, 2	013					+	< I	<u>i⊢req/Unannel</u>
Ref 19.1 ≠Peak [dBm		#Atten 1	BdB					43.24	dBm	Center Freq 13.5000000 GHz
∟og 10 - dB/ - Offst											Start Freq 999.999999 MHz
11.1 dB		2	3	بالمعرب ا		- Myumany	m		, nun		Stop Freq 26.0000000 GHz
≠PAvg -	<u></u>										CF Step 2.41200000 GHz Auto <u>Ma</u>
Start 1.00 GHz Res BW 1 MHz				#VBW 3 MHz Swe			Stop 26.00 GHz weep 125 ms (601 pts)			Freq Offset 0.00000000 Hz	
manker 1 2 3		race (1) (1) (1)	rype Freq Freq Freq		2 4 7	Axis .42 GHz .87 GHz .29 GHz			Ampilto 15.06 dE -43.24 dE -45.13 dE	Jae 9m Im Im	Signal Track On <u>Of</u>



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s Agriefit 10.40.	.00 Api 20, 2010		Mkr1	7 209 771 7 6	- 	riegionanner I	
lef7.1 dBm A∨g	#Atten 6 dB			-52.118 dE	mz 3m	Center Freq 7.30983333 GHz	
og 0 B/						Start Freq 7.30933333 GHz	
B						Stop Freq 7.31033333 GHz	
PAvg		1				CF Stej 2.43700000 GHz Auto <u>M</u> a	
V1 S2 3 FS AA						Freq Offset 0.00000000 Hz	
(f): Tun wp						Signal Track On <u>O</u>	
enter 7.309 833 3	3 GHz #1	/BW 3 MH7	Swaa	Span 1	MHz		



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			Mb-1 4.0	10 945 0 CU-	
ef20dBm Avg	Atten 10 dB		MIKIT 4.3	-59.010 dBm	Center Freq 4.92000000 GHz
9g					Start Freq 4.91950000 GH;
3					Stop Free 4.92050000 GH;
PAvg					CF Ste 100.000000 kHz <u>Auto M</u>
1 S2 3 FS AA	1				Freq Offset 0.00000000 Hz
f): Fun Wp	◇	*********	4,4	••••••••••••••••••••••••••••••••••••••	Signal Tracl On <u>C</u>
enter 4.920 000 (0 GHz	3W/ 3 MH7	Swaan	Span 1 MHz	



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HIGH	CHA ent 15:0	NNE	EL 24	62, F	PEAk	<			F	х т	Freq/Chanr	
Ref 19.1 #Peak	dBm	;	#Atten 1	8 dB				N	lkr1 2.4 15.6	l6 GHz 1 dBm	Center Fi 13.5000000 (req 3Hz
Log 10 - dB/ - Offst											Start Fr 999.999999 1	req MHz
11.1 dB		2	 ⊘		grand and the	the same of the		and the second second	. Anna		Stop F 26.0000000 (req ƏHz
#PAvg -											CF : 2.41200000 (Auto	Step 3Hz <u>Man</u>
Start 1.0 #Res BV	Start 1.00 GHz #Res BW 1 MHz			#VBW 3 MHz Sweep 12				St ep 125	top 26.0 ms (601	0 GHz pts)	Freq Off: 0.00000000	set Hz
Marker 1 2 3	Tra (1 (1	ace)))	Type Freq Freq Freq		× 2 4 7	Axis 46 GHz 92 GHz 37 GHz			Amplitu 15.61 dE -42.72 dE -47.22 dE	ude 9m Im Im	Signal Tr On	ack <u>Off</u>
Copyrigh	it 2000-2	2011 Ag	gilent Tec	hnologi	es							



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HIGH CHAN # Agilent 15:55:	NNEL 2462, A :57 Apr 20, 2013	AVERAG	E		F	λΤ	Freq/Channel
Ref 7.1 dBm #Avg	#Atten 6 dB		M	kr1 7.38	4 916 7 -55.048	GHz dBm	Center Freq 7.38493333 GHz
Log 10 dB/							Start Freq 7.38443333 GHz
dB							Stop Freq 7.38543333 GHz
#PAvg		1					CF Step 2.4620000 GHz Auto <u>Man</u>
W1 S2 S3 FS AA		¥					Freq Offset 0.00000000 Hz
¤(f): FTun Swp							Signal Track ^{On <u>Off</u>}
Center 7.384 933 3 #Res BW 1 MHz	3 GHz #V	BW 3 MHz	#Swee	ep 1.52	Span ms (601	1 MHz pts)	
Copyright 2000-201	11 Agilent Technologi	es					

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RESTRICTED BANDEDGE (LOW CHANNEL)



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			м	kr1 4.82	23 981 7	GHz	
ef 7.1 dBm Avg	#Atten 6 dB				49.499	dBm	Center Freq 4.82383333 GHz
og) B/							Start Freq 4.82333333 GHz
1.1 3							Stop Fred 4.82433333 GHz
PAvg			1				CF Ste 2.41200000 GHz Auto <u>M</u>
1 S2 3 FS AA							Freq Offset 0.00000000 Hz
f): Fun wp							Signal Track On <u>C</u>
enter 4.823 833 3	3 GHz #1	/PW/2 MHz	c		Span	1 MHz	



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				Mkr3 7.23 GHz	
Ref 20 dB	n	Atten 10	dB	-46.79 dBm	Center Freq
#Peak	\$				13.0150000 GHz
Log					
					Start Freq
					- 30.000000 MHz
20.9					
dB					- Stop Freq
				her a de la materia da materia	26.000000 GHz
adore,	and the second	the start	and the second s	- int other particular	
LgAv 📙		_			- 2.59700000 GH2
54-14 20 M				Char 20.00 CH-	
Start 30 M	ПZ (МЦ~		#\/D\W 2 MU~	Stop 26.00 GHZ	Freq Offset
Marker		Туре	# V D VV 3 WITZ X Axis	Sweep 123.5 ms (our pts)	0.0000000 Hz
1	(1)	Freq	2.41 GHz	12.93 dBm	
2	(1)	Freq	4.83 GHz	-46.64 dBm	Signal Track
3	(1)	Freq	7.23 GHz	-46.79 dBm	0n <u>O</u>



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0	······	ML 4 7	10 00C 7 CH-	
əf 20 dBm	Atten 10 dB	MIKET 7.	-50.304 dBm	Center Freq 7.2500000 GHz
9g				Start Freq 7.24950000 GHz
ifst .9 3				Stop Free 7.25050000 GH;
2Avg				CF Ste 100.000000 kHz <u>Auto M</u>
S2 FS		1-19-,		Freq Offset
): [un				Signal Tracl
enter 7.250 000	0 GHz		Span 1 MHz	



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			Mbr1 4 972 949 2 CH-	
Ref7.1 dBm ≇Ava	#Atten 6 dB		-51.113 dBm	Center Freq 4.87390000 GHz
Log				
10 1B/				Start Freq 4.87340000 GHz
Offst				
IB				Stop Freq 4.87440000 GHz
				CE Ste
				2.43700000 GHz
100		•		Auto <u>Ma</u>
V1 S2 53 FS				Freq Offset
AA				
I(f):				Signal Track
Swp				On
Center 4.873 900 () GHz		Span 1 MF	z



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🔆 Agiler	nt 12:37:46	Apr 24, 201	3		RΤ	Freq/Channel
Ref 20 dB #Peak	m �	Atten 10	dB	M	kr3 7.37 GHz -46.27 dBm	Center Freq 13.5000000 GHz
Log 10 dB/ Offst	_1					Start Freq 1.00000000 GHz
20.9 dB	2 Vora Ŷ		have a second a second	~~~~~	man	Stop Freq 26.0000000 GHz
#PAvg						CF Step 2.50000000 GHz <u>Auto Mar</u>
Start 1.00 #Res BW	GHz 1 MHz		#VBW 3 MHz	St Sweep 125 i	op 26.00 GHz ms (601 pts)	Freq Offset
Marker 1 2 3	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 2.48 GHz 4.92 GHz 7.37 GHz		Amplitude 13.83 dBm 45.63 dBm 46.27 dBm	Signal Track On <u>Off</u>
	2000 2014	vilent Tech				



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🌾 Agilent 12:30:3	33 Apr 24, 2013			RT	Freq/Channel
tef 20 dBm A∨g	Atten 10 dB		Mkr1 7.3	69 591 7 GHz -54.319 dBm	Center Freq 7.37000000 GHz
og 0 B/					Start Freq 7.36950000 GHz
B					Stop Freq 7.37050000 GHz
PAvg 00					CF Step 100.000000 kHz <u>Auto Ma</u>
3 FS AA (f):					
Tun Swp					Signal Irack On <u>Of</u>
enter 7.370 000 0 Res BW 1 MHz	GHz #VB\	N 3 MHz	Sweep 1	Span 1 MHz ms (601 pts)	



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is region r.oo.	.10 Apr 20, 2010				<u> </u>	
Ref 7.1 dBm Avg	#Atten 6 dB		MKr1	4.923 983 3	GHZ dBm	Center Freq 4.92390000 GHz
.og 0 IB/						Start Freq 4.92340000 GHz
I.1 IB						Stop Freq 4.92440000 GHz
PAvg 00		1				CF Step 2.46200000 GHz Auto <u>M</u> a
V1 S2 53 FS AA						Freq Offset 0.00000000 Hz
(f): Tun Swp						Signal Track On <u>Of</u>
Center 4.923 900 (0 GHz #\	/BW/3 MHz	Swa	Span	1 MHz	



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Date:		4/22/2013							
Test Engine	er:	Oliver Su							
Client:		Qualcomm							
Project Nu	nber:	13U14995							
, Configurati	on:	Тх							
Mode of op	eration:	11b 2.4GHz		<u>Note:</u> if th	e PK margi	n is greater th	nan 20 dB, the	re is no nee	d to get AVG rea
Channel	Frequency	PXA PK Reading	PXA PK Reading	AG/Chain	PK EIRP	PK E-field	PK E-field Margin	Software	AVG Power
	(chain o (abin)	Chain 1 (dBm)	(0.5.)	(ubiii)	(dBm)	(dB)	betting	(dBm)
1 (2412)	2388	-41.99	-40.79	2	-33.33	-21.2	-12.13	18.50	17.8/18.0
2(2417)	2389	-44.37	-43.11	2	-35.67	-21.2	-14.47	18.00	18/18.1
10 (2457)	2484	-40.96	-43.24	2	-33.93	-21.2	-12.73	19.00	19/18
11 (2462)	2487	-40.45	-42.26	2	-33.24	-21.2	-12.04	18.50	19.0/18.0
Channel	Frequency	PXA AVG	PXA AVG	AG/Chain	AVG EIRP	AVG E-field	AVG E-field	Software	AVG Power
	(MHz)	Reading Chain 0 (dBm)	Reading Chain 1 (dBm)	(dBi)	(dBm)	Limit (dBm)	Margin (dB)	Setting	Meter Reading (dBm)
1 (2412)	2390	-51.235	-51.425	2	-43.31	-41.2	-2.11	18.00	17.8/17.6
2(2417)	2390	-52.853	-49.974	2	-43.16	-41.2	-1.96	18.00	18/18.1
10 (2457)	2483	-49.718	-53.504	2	-43.19	-41.2	-1.99	19.00	19/18
11 (2462)	2483	-49.741	-51.425	2	-42.48	-41.2	-1.28	18.00	18.5/17.6

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Date:		4/24/2013							
Test Engine	er:	Oliver Su / T. Wa	igoner						
Client:	_	Qualcomm Athe	ros						
Project Nur	nber:	13U14995							
Configurati	Configuration: Tx								
Mode of op	eration:	11b 2.4GHz		Note: if th	e PK margi	in is greater th	nan 20 dB, the	re is no nee	d to get AVG rea
Channel	Frequency	PSA PK Reading	PSA PK	AG/Chain	PK EIRP	PK E-field	PK E-field	Software	AVG Power
	(MHz)	Chain 0 (dBm)	Reading	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading
			Chain 1 (dBm)			(dBm)	(dB)		(dBm)
1 (2412)	4920	-42.34	-44.87	2	-35.40	-21.2	-14.20	19.00	19.4 / 19.6
1 (2412)	7370	-46.37	-43.49	2	-36.68	-21.2	-15.48	19.00	19.4 / 19.6
2 (2417)	4830	-44.26	-46.64	2	-37.27	-21.2	-16.07	19.00	18.3 / 18.32
2 (2417)	7250	-43.2	-46.79	2	-36.61	-21.2	-15.41	19.00	18.3 / 18.32
6 (2437)	4874	-43.24	-45.56	2	-36.23	-21.2	-15.03	19.00	20.1/19.3
6 (2437)	7311	-45.13	-47.66	2	-38.19	-21.2	-16.99	19.00	20.1/19.3
10 (2457)	4920	-43.57	-45.63	2	-36.46	-21.2	-15.26	19.00	19/18
10 (2457)	7370	-44.56	-46.27	2	-37.31	-21.2	-16.11	19.00	19/18
11 (2462)	4924	-42.72	-44.88	2	-35.65	-21.2	-14.45	19.00	20.3 / 19.3
11 (2462)	7374	-47.22	-46.97	2	-39.07	-21.2	-17.87	19.00	20.3 / 19.3
Channel	Frequency	PSA AVG	PSA AVG	AG/Chain	AVG EIRP	AVG E-field	AVG E-field	Software	AVG Power
	(MHz)	Reading	Reading	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading
		Chain 0 (dBm)	Chain 1 (dBm)			(dBm)	(dB)		(dBm)
1 (2412)	4823	-50.367	-49 499	2	-41.89	-40.2	-1.69	18.50	18.8/19.1
1 (2412)	7370	-50.135	-49.475	2	-41.77	-41.2	-0.57	19.00	19.4 / 19.6
2 (2417)	4830	-56.913	-57.601	2	-49.22	-41.2	-8.02	18.00	18.3 / 18.32
2 (2417)	7250	-52.036	-50.304	2	-43.06	-41.2	-1.86	18.00	18/18.1
6 (2437)	4874	-49.372	-51.113	2	-42.14	-41.2	-0.94	17.50	18.7 / 17.8
6 (2437)	7311	-52.118	-55.592	2	-45.50	-41.2	-4.30	19.00	20.1/19.3
10 (2457)	4920	-59.01	-59.335	2	-51.15	-41.2	-9.95	19.00	19/18
10 (2457)	7370	-52.539	-54.319	2	-45.32	-41.2	-4.12	19.00	19/18
11 (2462)	4924	-49.227	-51.291	2	-42.12	-41.2	-0.92	17.00	18.5/17.4
11 (2402)	7274	FF 040	CO 220	2	40.01	41.2	7 71	10.00	20.2/10.2

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8.2. 802.11g MODE IN THE 2.4 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

<u>RESULTS</u>

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain 0	Chain 1	Limit
	(MHz)	(MHz)	(MHz)	(MHz)
Low	2412	16.460	16.540	0.5
Low	2417	16.500	16.540	0.5
Mid	2437	16.460	16.580	0.5
High	2457	16.540	16.500	0.5
High	2462	16.540	16.500	0.5

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6 dB BANDWIDTH, Chain 1



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REPORT NO: 13U14995-1 FCC ID: PPD-QCA6234

8.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW	99% BW
		Chain 0	Chain 1
	(MHz)	(MHz)	(MHz)
Low	2412	16.5478	16.4422
Low	2417	16.5540	16.5913
Mid	2437	16.5554	16.5923
High	2457	16.5542	16.5382
High	2462	16.5072	16.5612

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99% BANDWIDTH Cha	in 0 HIGH (CH (2462)	RТ	Freq/Channel
Ch Freq 2.462 GHz Occupied Bandwidth	Avera	ages: 100	Trig Free	Center Freq 2.46200000 GHz
				Start Freq 2.43700000 GHz
Ref 30 dBm Atten 30 dB #Samp				Stop Freq 2.48700000 GHz
Offst Offst <th< th=""><th></th><th></th><th>MANAMA MANANA</th><th>CF Step 5.0000000 MHz <u>Auto Man</u></th></th<>			MANAMA MANANA	CF Step 5.0000000 MHz <u>Auto Man</u>
Center 2.462 00 GHz #Res BW 510 kHz #\	/BW 1.5 MHz	Sweep 1 r	Span 50 MHz ns (601 pts)	0.00000000 Hz
Occupied Bandwidth 16.5072 N	o₀ ∕IHz	c BW % Pwr x dB	99.00 % -26.00 dB	Signal Irack On <u>Off</u>
Transmit Freq Error -50.232 x dB Bandwidth 19.418	kHz MHz*			
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99% BANDWIDTH, Chain 1



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99% BANDWIDTH Chain	1 LOW CH (241	7) R T	Freq/Channel
Ch Freq 2.417 GHz Occupied Bandwidth	Averages: 100	Trig Free	Center Freq 2.41700000 GHz
			Start Freq 2.39200000 GHz
Ref 30 dBm #Atten 30 dB #Samp			Stop Freq 2.44200000 GHz
ID No.1 dB/		All And	CF Step 5.0000000 MHz <u>Auto Man</u>
dB		Span 50 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwidth	<u>W 1.3 MHz Sweej</u> Осс BW % Р\ Ц 7 × d	vr 99.00 % B -26.00 dB	Signal Track ^{On <u>Off</u>}
Transmit Freq Error -7.145 kH x dB Bandwidth 19.660 Mi	z Hz*		
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8.2.3. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 14.88 dB (including 10 dB pad, power splitter 3.4 dB, and 1.48 cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	2412	10.10	9.10	12.64
Low	2417	13.15	13.40	16.29
Mid	2437	18.70	17.60	21.20
High	2457	14.50	12.80	16.74
High	2462	9.30	8.70	12.02

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8.2.4. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
2.00	2.00	2.00

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Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	2.00	30.00	30	36	30.00
Low	2417	2.00	30.00	30	36	30.00
Mid	2437	2.00	30.00	30	36	30.00
High	2457	2.00	30.00	30	36	30.00
High	2462	2.00	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margin
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	16.35	16.89	19.64	30.00	-10.36
Low	2417	20.84	21.10	23.98	30.00	-6.02
Mid	2437	26.30	25.36	28.87	30.00	-1.13
High	2457	22.86	21.18	25.11	30.00	-4.89
High	2462	18.95	16.90	21.06	30.00	-8.94

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OUTPUT POWER, Chain 1



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8.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Meas	Meas	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	-17.05	-15.98	-13.47	8.0	-21.5
Low	2417	-11.62	-11.53	-8.56	8.0	-16.6
Mid	2437	-6.93	-6.82	-3.86	8.0	-11.9
High	2457	-9.68	-10.87	-7.22	8.0	-15.2
High	2462	-13.77	-16.61	-11.95	8.0	-20.0

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PSD, Chain 0





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PSD, Chain 1



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PSD, Cha	i n 1 5:02:41 /	L OW Apr 30, 2	CH (2013	2417	7)			F	RТ	Freq/Channel
Ref 30 dBm #Peak	1	#Atten 3	0 dB				Mkr1	2.423 2 [.] -11.53	1 GHz dBm	Center Freq 2.41700000 GHz
Log 10 dB/ Offet										Start Freq 2.40450000 GHz
14.9 dB DI							1			Stop Freq 2.42950000 GHz
8.0 dBm LgA∨	ļ.	wwww	pm/What	WWW	handad	WM	www.w	M		CF Step 2.5000000 MHz <u>Auto Man</u>
V1 S2 S3 FC	and the second							Muny	Mary No.	Freq Offset 0.00000000 Hz
¤(f): FTun Swp									*¥UV	Signal Track On <u>Off</u>
Center 2.417 0 #Res BW 3 kH	0 GHz z		#V	BW 10 I	Hz	Swe	ep 2.636	Span 2 5 s (601	25 MHz [°] pts)	
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8.2.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

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RESULTS

IN-BAND REFERENCE LEVEL, Chain 0



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	Atten 30	dB	-35.7	72 dBm	Center Freq
#Peak					13.0130000 0112
10					Start Fred
dB/					30.0000000 MH
Offst					
14.9					Stop Fred
				2	26.0000000 GHz
-12.5		No. of Concession, Name of Street, or other	-	and the second s	
dBm					CF Ste
LgAv					Auto M
Start 30 MHz			Stop 26.0	00 GHz	
#Res BW 100 kHz	z	#VBW 300 kHz	Sweep 2.482 s (200	1 pts)	
Manker Trac	e Type	X Axis	Ampl	litude	0.00000000 112
1 (1) 2 (1)	Freq Freq	1.523 GHz 24.779 GHz	-46.22 (-35.72 (dBm dBm	Signal Trad

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LOW CHANNEL BANDEDGE, Chain 1



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HIGH CHANNEL BANDEDGE, Chain 1



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OUT-OF-BAND EMISSIONS, Chain 1



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8.2.7. CONDUCTED BE AND SPURIOUS IN RESTRICTED BANDS (no filter unit)

RESTRICTED BANDEDGE

Chain 0



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 Agrient 10:09: 	33 Apr 25, 2013	K I	Freq/Channel
ef 20 dBm Avg	Atten 10 dB	Mkr1 2.390 00 GHz -51.704 dBm	Center Fred 2.35000000 GH;
og) B/			Start Freq 2.31000000 GH:
htst).9 B			
PAvg			CF Ste 8.00000000 MH: <u>Auto M</u>
1 S2 3 FS AA			Freq Offset
(f): Tun wp			Signal Tracl
tart 2.310 00 GHz	///BW/3	 Stop 2.390 00 GHz	

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·	• •		Mbr1 2.4	93 665 0 CH-	
20 dBm ak	Atten 10 dB			-29.16 dBm	Center Fred 2.49175000 GH
					Start Fred 2.48350000 GH
					Stop Fre 2.50000000 GH
vg	man man manual	mal Mana			CF Ste 1.65000000 MH <u>Auto M</u>
S2 FC AA			**************************************	What serve about the second	Freq Offset 0.00000000 Hz
n					Signal Traci On <u>(</u>
t 2.483 500 0 GH s BW 1 MHz	 Iz #\/	/BW 3 MHz	Stop 2.50	00 000 0 GHz	



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-		Mkr1 2 483 500 0 GHz	
7.1 dBm #/	Atten 10 dB	-29.08 dBm	Center Free 2.49175000 GH
			Start Fred 2.48350000 GH
*			Stop Fre 2.5000000 GH
∨g vg	with the water and the second second	The AM March March and March and March	CF Sta 1.65000000 MH <u>Auto h</u>
S2 FC AA			Freq Offse 0.00000000 H;
n			Signal Trac
t 2.483 500 0 GHz	#VBW 3 MH7	Stop 2.500 000 0 GHz	



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Chain 1





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-			Mbr1 2.49	22 940 0 CH-	
f 20 dBm eak	Atten 10 dB			-31.31 dBm	Center Frec 2.49175000 GH;
g					Start Freq 2.48350000 GH;
9					- Stop Fred 2.5000000 GH;
Avg	Mary Marine M				CF Ste 1.6500000 MH: <u>Auto M</u>
S2 FC AA			White Monterver	nolandina	Freq Offset
: un 19					Signal Tracl On <u>C</u>
urt 2.483 500 0 GI	Hz #VE	2W 2 MHz	Stop 2.50	00 000 0 GHz	



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			ML-4 -2 44	02.040.0.CU-	
7.1 dBm ak	#Atten 10 dB			-35.30 dBm	Center Fred 2.49175000 GH
					Start Free 2.48350000 GH
1					Stop Fre 2.5000000 GH
vg	markener	nuderer more man	hereway		CF St 1.65000000 MH <u>Auto N</u>
S2 FC AA					Freq Offse 0.00000000 H:
n					Signal Trac
t 2.483 500 0 G	iHz #VI	3W 3 MH7	Stop 2.50	00 000 0 GHz	



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Chain 0





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Agrent 12.04.	41 /hpi 24, 2010		Mket	1 924 460 0 CH-	
ef 20 dBm Avg	Atten 10 dB			-57.247 dBm	Center Freq 4.83400000 GHz
0g) B/					Start Freq 4.83350000 GHz
B					Stop Freq 4.83450000 GHz
PAvg					CF Ste 100.000000 kHz <u>Auto M</u>
1 S2 3 FS AA			1		Freq Offset 0.00000000 Hz
f): Fun wp	<u></u>		· · · · · · · · · · · · · · · · · · ·		Signal Track On <u>O</u>
enter 4.834 000 0 Res BW 1 MHz) GHz	#VBW 3 MHz	Swaa	Span 1 MHz	



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		Mkr1 7 310 858 GHz	<u>انت ان </u>
f1.1 dBm ∨q	#Atten 0 dB	-60.857 dBm	Center Fred 7.31316667 GH:
g			Start Frec 7.31066667 GH:
.1			Stop Free 7.31566667 GH
Avg			CF Ste 2.43700000 GH: Auto <u>M</u>
1 S2 FS AA			Freq Offset 0.00000000 Hz
): un vp			Signal Trac On <u>(</u>
enter 7.313 167 G	GHz #\/PW/2_MHz	Span 5 MHz	



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🔆 Agilent 07:37:	52 Apr 25, 2013			RT	Freq/Channel
Ref20dBm ≇Avg	Atten 10 dB		Mkr1 4.9	14 108 3 GHz -56.439 dBm	Center Freq 4.91400000 GHz
Log 10 1B/					Start Freq 4.91350000 GHz
4B					Stop Freq 4.91450000 GHz
PAvg					CF Step 100.000000 kHz <u>Auto Ma</u>
V1 S2 S3 FS AA					Freq Offset 0.00000000 Hz
¤(f): =Tun §wp					Signal Track On <u>Of</u>
Center 4.914 000 0 #Res BW 1 MHz) GHz #VB	W 3 MHz	Sweep 1	Span 1 MHz ms (601 pts)	



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HIGH (🔆 Agiler	CHANN nf 10:15:54	EL 2462 Apr 20, 2013	2, PEAK ₃		RТ	Freq/Channel
Ref 19.1 d #Peak	IBm	#Atten 18 d	IB	N	Mkr3 7.29 GHz -46.82 dBm	Center Freq 13.500000 GHz
Log 10 dB/ Offst						Start Freq 1.0000000 GHz
11.1 dB	2 	3		and a star a star and a star a star and a star a star a	and the second	Stop Freq 26.000000 GHz
LgAv -						CF Step 2.5000000 GHz <u>Auto Man</u>
Center 13 #Res BW	.50 GHz 1 MHz		#VBW 3 MHz	Sweep 125	Span 25 GHz ms (601 pts)	Freq Offset
Marker 1 2 3	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 2.48 GHz 4.92 GHz 7.29 GHz	·	Amplitude 15.75 dBm -46.25 dBm -46.82 dBm	Signal Track On <u>Off</u>
Copyright	2000-201 <u>1 A</u>	gilent Techn	ologies			



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			ML 2 7	202.202.01	
ef 1.1 dBm Avg	#Atten 0 dB		MKr1 /.	383 292 GHZ -63.006 dBm	Center Freq 7.38575000 GHz
9g) 3/					Start Freq 7.38325000 GHz
3					Stop Frec 7.38825000 GHz
PAvg					CF Ste 2.46200000 GHz Auto <u>M</u>
1 S2 3 FS AA	**************************************		2000 - 10 - 10 - 10 - 10 - 10 - 10 - 10	Classing and the second s	Freq Offset 0.00000000 Hz
f): Гun wp					Signal Track On <u>C</u>
enter 7.385 750 G Res BW 1 MHz	iHz #VI	3W 3 MHz	Sweep 1	Span 5 MHz ms (601 pts)	

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RESTRICTED BANDEDGE (LOW CHANNEL)



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Agilent 11:55:	33 Apr 20, 2013		RT	Freq/Channel
tef 1.1 dBm A∨g	#Atten 0 dB		Mkr1 4.824 092 GHz -60.653 dBm	Center Freq 4.82350000 GHz
og 0 B/				Start Freq 4.82100000 GHz
B				Stop Freq 4.82600000 GHz
PAvg 00		1		CF Step 2.41200000 GHz Auto <u>Ms</u>
V1 S2	2004 gaza ar g			Freq Offset 0.00000000 Hz
(f): Tun wp				Signal Track On <u>Of</u>
Center 4.823 500 (Res BW 1 MHz	GHz #VBW	3 MHz S	Span 5 MHz weep 1 ms (601 pts)	



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🔆 Agile	nf 12:51:28	Apr 24, 20	13		RT	Freq/Channel
Ref20dB #Peak ∏	Bm ♦	Atten 10	dB		Mkr3 7.25 GHz -43.68 dBm	Center Freq 13.5000000 GHz
Log 10 dB/ Offst						Start Freq 1.00000000 GHz
20.9 dB	2	3		and a second		Stop Freq 26.0000000 GHz
#PAvg —						CF Step 2.50000000 GHz <u>Auto Mar</u>
Start 1.00 #Res BW	GHz 1 MHz		#VBW 3 MHz	Sweep 125	Stop 26.00 GHz 5 ms (601 pts)	Freq Offset
Marker 1 2 3	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 2.42 GHz 4.83 GHz 7.25 GHz		Amplitude 14.01 dBm -47.36 dBm -43.68 dBm	Signal Track On <u>Off</u>
Conside	2000-2011-2					



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		Mkr1 7.2	250 875 0 GHz	1
ef 20 dBm	Atten 10 dB		-54.312 dBm	Center Fred 7.25100000 GH
g				L
3/				Start Fred 7.25050000 GH
íst 🔤				
)				Stop Fre 7.25150000 GH
				CE Ste
Avg				100.000000 kH: <u>Auto N</u>
S2				Ered Offset
FS AA				0.00000000 Hz
):				Signal Trac
un b				On <u>(</u>
"P				
enter 7.251 000	0 GHz		Span 1 MHz	
esBW1MHz #VBW		3 MHz Sweep 1	ms (601 pts)	



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-	• •		Mired 4	1 972 102 CU-	
1.1 dBm	#Atten 0 dB		WIKET 4	-60.269 dBm	Next Pe
/g					
'					
					Next Pk Rig
st 🛛					
'					Next Pk Le
Ava					Min Sear
		↓ →			
S2		hannen an	land the second second		Pk-Pk Searc
· — —					
in					Mkr ©
p					
	<u> </u>				Mo Mo
nter 4.8/3 66/ GF	1Z			Span 5 MHz	1 of



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HIGH (CHANN 11 13:08:28	EL 245 Apr 24, 201	7, PEAK 3		RТ	Freq/Channel
Ref 20 dB #Peak	m �	Atten 10	dB		Mkr3 7.04 GHz -45.35 dBm	Center Freq 13.5000000 GHz
Log 10 dB/ Offst						Start Freq 1.0000000 GHz
20.9 dB	Ž na ž	<u>з</u>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	Stop Freq 26.0000000 GHz
#PAvg						CF Step 2.5000000 GHz <u>Auto Mar</u>
Start 1.00 #Res BW	GHz 1 MHz		#VBW 3 MHz	Sweep 12	Stop 26.00 GHz 25 ms (601 pts)	Freq Offset
Manker 1 2 3	Trace (1) (1) (1)	Type Freq Freq Freq	X Axis 2.46 GHz 4.91 GHz 7.04 GHz		Amplitude 14.15 dBm -46.39 dBm -45.35 dBm	Signal Track On <u>Off</u>
Convright 3	2000-2011 4	ailent Tech				



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			Mkr1 7.04	0 261 7 GHz	
ef20 dBm Avg □	Atten 10 dB			-56.675 dBm	Center Freq 7.04000000 GHz
bg) B/					Start Freq 7.03950000 GHz
Hst).9 B					Stop Freq 7.04050000 GHz
Avg					CF Stej 100.000000 kHz <u>Auto Ma</u>
1 S2 3 FS AA			1		Freq Offset 0.00000000 Hz
f): Fun wp					Signal Track On <u>O</u> f
enter 7.040 000 Res BW 1 MHz	0 GHz	VBW 3 MHz	Sweep 1	Span 1 MHz ms (601 pts)	



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✤ Agilent 12:07:	34 Apr 20, 2013			RТ	Freq/Channel
Ref 1.1 dBm #Avg	#Atten 0 dB		Mkr1 4.9 -(23 158 GHz 50.116 dBm	Center Freq 4.92441667 GHz
Log 10 dB/					Start Freq 4.92191667 GHz
dB					Stop Freq 4.92691667 GHz
#PAvg	1				CF Step 2.46200000 GHz Auto <u>Mar</u>
W1 S2 S3 FS AA		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		******	Freq Offset 0.00000000 Hz
¤(f): FTun Swp					Signal Track On <u>Off</u>
Center 4.924 417 (#Res BW 1 MHz	GHz #V	BW 3 MHz	Sweep 1 n	Span 5 MHz ns (601 pts)	



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	ica opunou.			wana5j					
Date:		4/25/2013							
Test Engine	er:	Oliver Su / T. Wa	igoner						
Client:		Qualcomm Athe	ros						
Project Nur	nber:	13U14995							
Configurati	on:	Тх							
Mode of op	eration:	11g 2.4GHz		Note: if th	e PK marg	in is greater th	han 20 dB, the	re is no nee	d to get AVG rea
Channel	Frequency (MHz)	PSA PK Reading Chain 0 (dBm)	PSA PK Reading Chain 1 (dBm)	AG/Chain (dBi)	PK EIRP (dBm)	PK E-field Limit (dBm)	PK E-field Margin (dB)	Software Setting	AVG Power Meter Reading (dBm)
1 (2412)	2390	-31.33	-29.59	2	-22.35	-21.2	-1.15	11.50	10.0 / 10.7
2 (2417)	2389	-35.41	-30.59	2	-24.34	-21.2	-3.14	15.00	14 / 14.2
10 (2457)	2483	-29.03	-31.18	2	-21.95	-21.2	-0.75	16.00	16.3 / 15
11 (2462)	2483	-28.95	-35.17	2	-23.01	-21.2	-1.81	11.50	12.4/10.6
Channel	Frequency	PSA AVG	PSA AVG	AG/Chain	AVG EIRP	AVG E-field	AVG E-field	Software	AVG Power
	(MHz)	Reading Chain 0 (dBm)	Reading Chain 1 (dBm)	(dBi)	(dBm)	Limit (dBm)	Margin (dB)	Setting	Meter Reading (dBm)
1 (2412)	2390	-51.269	-48.953	2	-41.94	-41.2	-0.74	9.50	8.2/8.2
2 (2417)	2389	-51.574	-48.767	2	-41.93	-41.2	-0.73	13.50	13 / 13
10 (2457)	2483	-48.765	-50.686	2	-41.60	-41.2	-0.40	14.00	14.5 / 12.8
11 (2462)	2483	-50.854	-52.19	2	-43.45	-41.2	-2.25	9.50	9.3/8.7

Note: Duty Cycle Correction Factor already added. DCCF= 0.127

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REPORT NO: 13U14995-1 FCC ID: PPD-QCA6234 HARMONIC SPURIOUS DATA

2TX Conduc	ted Spurious	s for FCC DTS (in t	he restricted ba	inds)					
Date:		4/24/2013							
Test Engine	er:	Oliver Su / T. Wa	igoner						
Client:		Qualcomm Athe	ros						
Project Nur	nber:	13U14995							
Configurati	on:	Тх							
Mode of op	eration:	11g 2.4GHz		Note: if th	e PK margi	in is greater th	nan 20 dB, the	re is no nee	d to get AVG rea
·						Ū			
Channel	Frequency	PSA PK Reading	PSA PK	AG/Chain	PK EIRP	PK E-field	PK E-field	Software	AVG Power
	(MHz)	Chain 0 (dBm)	Reading	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading
			Chain 1 (dBm)			(dBm)	(dB)		(dBm)
1 (2412)	4824	-47.2	-48.09	2	-39.60	-21.2	-18.40	18.00	18.7/17.6
1 (2412)	7236	-46.95	-46.11	2	-38.49	-21.2	-17.29	18.00	18.7/17.6
2 (2417)	4834	-48.03	-47.23	2	-39.59	-21.2	-18.39	18.00	17 / 17
2 (2417)	7251	-45.6	-43.55	2	-36.43	-21.2	-15.23	18.00	17 / 17
6 (2437)	4874	-47.02	-48.18	2	-39.54	-21.2	-18.34	18.00	18.7 / 17.6
6 (2437)	7311	-44.94	-46.1	2	-37.46	-21.2	-16.26	18.00	18.7 / 17.6
10 (2457)	4914	-47.85	-46.26	2	-38.96	-21.2	-17.76	18.00	17.95 / 17
10 (2457)	7040	-44.86	-45.22	2	-37.02	-21.2	-15.82	18.00	17.95 / 17
11 (2462)	4924	-46.12	-48.21	2	-39.02	-21.2	-17.82	18.00	18.7 / 17.6
11 (2462)	7386	-46.69	-46.98	2	-38.81	-21.2	-17.61	18.00	18.7 / 17.6
Channel	Frequency	PSA AVG	PSA AVG	AG/Chain	AVG EIRP	AVG E-field	AVG E-field	Software	AVG Power
	(MHz)	Reading	Reading	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading
		Chain 0 (dBm)	Chain 1 (dBm)			(dBm)	(dB)		(dBm)
1 (2/12)	4824	-60 128	60 522	2	-52.20	_/11 2	_11 10	18.00	197/176
1 (2412)	7236	-58 296	-57 9/1	2	-50.09	-41.2	-8.89	18.00	187/176
2 (2417)	4834	-57 117	-57.655	2	-49.36	-41.2	-8.16	18.00	17/17
2 (2417)	7251	-55 094	-54 182	2	-46 59	-41.2	-5 39	18.00	17/17
6 (2437)	4874	-58 613	-60 139	2	-51 20	-41.2	-10.09	18.00	187/176
6 (2437)	7311	-60 727	-64 257	2	-54.12	-41.2	-12.05	18.00	187/176
10 (2457)	/ JUI /	-56 209	-57 7/7	2	-18 95	_ <u>_</u> 1 7	-12.92	18.00	17 05 / 17
10 (2457)	70/0	-56.478	-56 545	2	-40.93	-41.2	-7.75	18.00	17.95/17
11 (2462)	4924	-57 529	-59 986	2	-40.49	-41.2	-9.37	18.00	187/176
11 (2402)	7206	-57.323	-53.300	2	-56.67	-41.2	-5.57	10.00	10.7/17.0
11 (2402)	7300	-02.8/0	-07.069		-30.03	-41.2	-13.43	10.00	10.1/11.0

Note: Duty Cycle Correction Factor already added. DCCF= 0.127

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8.2.8. CONDUCTED BE AND SPURIOUS IN RESTRICTED BANDS (3G filter unit)

RESTRICTED BANDEDGE

Chain 0



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Agilent 23:27:15 Jun	2417, AVERAGE 28, 2013	R T	Freq/Channel
Ref10dBm At #Avg	ten 10 dB	Mkr1 2.389 87 GHz -49.244 dBm	Center Freq 2.3500000 GHz
Log 10 dB/			Start Freq 2.31000000 GHz
dB			Stop Freq 2.39000000 GHz
#PAvg			CF Step 8.0000000 MHz <u>Auto Mar</u>
V1 S2 S3 FS	netter viter with the termine the second	Martin Contraction	Freq Offset 0.00000000 Hz
⊏(f): FTun Swp			Signal Track
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Stop 2.390 00 GHz Sweep 1 ms (601 pts)	

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			Mkr1 2.483 5	527 5 GHz	
ef 10 dBm Peak	Atten 10 dB			38.20 dBm	Center Freq 2.49175000 GHz
og 0 B/					Start Freq 2.48350000 GHz
9.8 B					Stop Freq 2.5000000 GHz
PAvg	And Mary Mary Market Market Market	anternative live and land	What was a second	Mrs. Marchalana	CF Step 1.6500000 MHz <u>Auto Ma</u>
1 S2 3 FC					Freq Offset 0.00000000 Hz
(f): Tun wp					Signal Track On <u>Of</u>
tart 2.483 500 0 (GHz	DW 2 MU-	Stop 2.500 (000 0 GHz	



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Agrient 00:04:.	24 JUN 29, 2013			R I	<u>i⊢req/⊂nannei</u>
f 10 dBm eak	Atten 10 dB		Mkr1 2.483	500 0 GHz -37.52 dBm	Center Fred 2.49175000 GH:
g					Start Freq 2.48350000 GH;
.8					Stop Free 2.50000000 GH:
Avg	the production of the second second	and you water	en wester and the first	manhana	CF Ste 1.65000000 MH: <u>Auto M</u>
S2 FC					Freq Offset 0.00000000 Hz
): un vp					Signal Tracl On <u>(</u>
art 2.483 500 0 G es BW 1 MHz	GHz #VE	8W 3 MHz	Stop 2.500	000 0 GHz	



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LOW CHANNEL 2412, PEAK 🔆 Agilent 23:16:44 Jun 28, 2013 Freq/Channel R Т Mkr1 2.390 00 GHz Center Freq Ref 10 dBm -35.25 dBm Atten 10 dB 2.35000000 GHz #Peak Log 10 Start Freq dB/ 2.31000000 GHz Offst 19.8 Stop Freq dB 2.39000000 GHz CF Step 8.00000000 MHz #PAva Auto Man HALPHARD AND V1 S2 mappinner Freq Offset \$3 FC 0.00000000 Hz ¤(f): Signal Track FTun On Off Swp Start 2.310 00 GHz Stop 2.390 00 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)



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			Mkr1 2.483 5	527 5 GHz	Contor From
ef 10 dBm Peak	Atten 10 dB		-3	3.41 dBm	2.49175000 GHz
0 g) B/					Start Freq 2.48350000 GHz
B					Stop Freq 2.50000000 GHz
PAvg	moles approximately and	and the second second second	Mythoday Wandharm	an more demons	CF Step 1.6500000 MHz <u>Auto Ma</u>
1 S2 3 FC					Freq Offset 0.00000000 Hz
f): Tun wp					Signal Track On <u>Of</u>
tart 2.483 500 0 (GHz #V	BW 3 MHz	Stop 2.500 0 Sween 1 ms	00 0 GHz	



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0			Mb-1 0.400	500 0 CH-	1
ef 10 dBm Peak	Atten 10 dB		MKIT 2.403	-33.91 dBm	Center Freq 2.49175000 GHz
9g 3/					Start Freq 2.48350000 GHz
1.8 3					Stop Frec 2.5000000 GHz
PAvg	montemation				CF Ste 1.65000000 MHz <u>Auto M</u>
I S2 3 FC				7-1-114 (1-14)	Freq Offset 0.00000000 Hz
f): Гun wp					Signal Track On <u>O</u>
art 2.483 500 0 G	GHz #VP	W 3 MH7	Stop 2.500	000 0 GHz	



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2TX Conduc	ted BE for FC	C DTS (in the res	tricted bands)							
Date:		6/29/2013								
Test Engine	er:	Chris Xiong								
Client:		Qualcomm Athe	im Atheros							
Project Nur	nber:	13U14995								
Configurati	on:	ТХ								
Mode of op	eration:	11g		Note: if the PK margin is greater than 20 dB, there is no need to get AVG reading.					ling.	
Channel	Frequency	PSA PK Reading	PSA PK Reading	AG/Chain	PK EIRP	PK E-field	PK E-field	Software	AVG Power	AVG Power
	(GHz)	Chain 0 (dBm)	Chain 1 (dBm)	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading -	Meter Reading
						(dBm)	(dB)	(dBm)	Chain 0 (dBm)	Chain 1 (dBm)
1	2.39	-32.52	-35.25	2	-25.65	-21.2	-4.45	11.50	8.23	7.66
2	2.3892	-35.91	-39.88	2	-29.44	-21.2	-8.24	15.00	11.33	10.77
10	2.4835275	-38.2	-33.41	2	-27.16	-21.2	-5.96	15.50	11.16	11.76

Channel	Frequency	PSA AVG	PSA AVG	AG/Chain	AVG EIRP	AVG E-field	AVG E-field	Software	AVG Power	AVG Power
	(MHz)	Reading	Reading	(dBi)	(dBm)	Limit	Margin	Setting	Meter Reading -	Meter Reading -
		Chain 0 (dBm)	Chain 1 (dBm)			(dBm)	(dB)	(dBm)	Chain 0 (dBm)	Chain 1 (dBm)
1	2.38987	-48.809	-50.649	2	-41.61	-41.2	-0.41	11.50	8.23	7.66
2	2.38987	-49.244	-50.818	2	-41.94	-41.2	-0.74	15.00	11.33	10.77
10	2.4835275	-50.886	-49.212	2	-41.95	-41.2	-0.75	15.50	11.16	11.76
11	2.4835	-49.693	-49.275	2	-41.46	-41.2	-0.26	12.00	7.87	7.97

Note: Duty Cycle Correction Factor already added to PSA for average measurement. DCCF= 0.127

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8.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

8.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

<u>RESULTS</u>

Channel	Frequency	6 dB BW	6 dB BW	Minimum
		Chain 0	Chain 1	Limit
	(MHz)	(MHz)	(MHz)	(MHz)
Low	2412	17.685	17.685	0.5
Low	2417	17.685	17.685	0.5
Mid	2437	17.685	17.685	0.5
High	2457	17.685	17.685	0.5
High	2462	17.685	17.685	0.5

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6 dB BANDWIDTH, Chain 1



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REPORT NO: 13U14995-1 FCC ID: PPD-QCA6234

8.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW	99% BW	
		Chain 0	Chain 1	
	(MHz)	(MHz)	(MHz)	
Low	2412	17.6283	17.5782	
Low	2417	17.6230	17.7226	
Mid	2437	17.7241	17.6372	
High	2457	17.6021	17.5066	
High	2462	17.6738	17.6501	

DATE: JULY 1, 2013 IC: 4104A-QCA6234

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99% BANDWIDTH Cha	in 0 MID CH (2437)	RT	Freq/Channel
Ch Freq 2.437 GHz Occupied Bandwidth	Averages: 100	Trig Free	Center Freq 2.43700000 GHz
			Start Freq 2.41200000 GHz
Ref 30 dBm Atten 30 dB #Samp Log	liveis, eksym and alle static and a		Stop Freq 2.46200000 GHz
dB/ Offst 14.9		A A A A A A A A A A A A A A A A A A A	CF Step 5.0000000 MHz <u>Auto Man</u>
Center 2.437 00 GHz #Res BW 560 kHz #	/BW 16 MHz Sween 1	Span 50 MHz ms (601 nts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth 17.7241	Occ BW % Pwr VIHz × dB	99.00 % -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error-47.939x dB Bandwidth22.006) kHz MHz*		
Copyright 2000-2011 Agilent Technolo	gies		



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99% BANDWIDTH Chain 0 HIGH CH (2462)	Freq/Channel
Ch Freq 2.462 GHz Trig Free Occupied Bandwidth Averages: 100	Center Freq 2.46200000 GHz
	Start Freq 2.43700000 GHz
Ref 30 dBm #Atten 30 dB #Samp	Stop Freq 2.48700000 GHz
10 dB/ Offst 14.9 →	CF Step 5.0000000 MHz <u>Auto Man</u>
dB Center 2.462 00 GHz Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 510 kHz #VBW 1.6 MHz Sweep 1 ms (601 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 17 6738 MHz × dB -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error -41.318 kHz × dB Bandwidth 20.185 MHz*	
Copyright 2000-2011 Agilent Technologies	

99% BANDWIDTH, Chain 1



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8.3.3. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 14.88 dB (including 10 dB pad, power splitter 3.4 dB, and 1.48 cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Total	
		Power	Power	Power	
	(MHz)	(dBm)	(dBm)	(dBm)	
Low	2412	7.60	8.30	10.97	
Low	2417	13.10	13.30	16.21	
Mid	2437	17.50	17.60	20.56	
High	2457	15.10	13.50	17.38	
High	2462	8.80	8.10	11.47	

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8.3.4. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0	Chain 1	Uncorrelated Chains		
Antenna	Antenna	Directional		
Gain	Gain	Gain		
(dBi)	(dBi)	(dBi)		
2.00	2.00	2.00		

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Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	2.00	30.00	30	36	30.00
Low	2417	2.00	30.00	30	36	30.00
Mid	2437	2.00	30.00	30	36	30.00
High	2457	2.00	30.00	30	36	30.00
High	2462	2.00	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margi
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	15.94	16.40	19.19	30.00	-10.81
Low	2417	20.78	21.16	23.98	30.00	-6.02
Mid	2437	25.78	24.76	28.31	30.00	-1.69
High	2457	22.24	20.68	24.54	30.00	-5.46
High	2462	17.30	16.46	19.91	30.00	-10.09

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OUTPUT POWER, Chain 1



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8.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

<u>RESULTS</u>

PSD Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Meas	Meas	PSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	-17.32	-16.56	-13.91	8.0	-21.9
Low	2417	-12.33	-12.34	-9.32	8.0	-17.3
Mid	2437	-7.52	-8.44	-4.95	8.0	-12.9
High	2457	-10.38	-12.44	-8.28	8.0	-16.3
High	2462	-16.61	-16.92	-13.75	8.0	-21.8

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PSD, Chain 0





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Atten 30 dE	3		7.52 JBm	Center Fred
			-1.52 abm	2.43700000 GHz
				
				Start Freq 2.42350000 GHz
				Stop Freq 2.45050000 GHz
- and the addition of the addi	mapapang munipur	ala ana ana ana ana ana ana ana ana ana	Min	
			N.	<u>Auto M</u>
//			Marwow	Freq Offset 0.00000000 Hz
				
				Signal Track



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PSD, Chain 1



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Mkr1 2.422 625 GHz Center Freq Ref 30 dBm #Atten 30 dB -12.34 dBm #Peak	PSD, Chain 1 L	OW CH (241 1ay 1, 2013	7)	R	T Freq/Channel
Log 10 10 10 10 10 10 10 10 10 10	Ref 30 dBm # #Peak	Atten 30 dB	N	Akr1 2.422 625 G -12.34 dl	GHz Bm 2.41700000 GHz
014.9 0 <th>Log 10 dB/ Offst</th> <th></th> <th></th> <th></th> <th>Start Freq 2.40350000 GHz</th>	Log 10 dB/ Offst				Start Freq 2.40350000 GHz
8.0 dBm LgAv V1 S2 S3 FC AA m(f): FTun Swp Center 2.417 000 GHz #VEW 10 kHz *VEW 10 k	14.9 dB DI		1		Stop Freq 2.43050000 GHz
V1 S2 S3 FC AA Inf(): FTun Swp Center 2.417 000 GHz #Bac RW 3 kHz #Center 2.417 000 GHz #Center 2.417 000	8.0 dBm ∰ LgAv	www.www.www.www.www.www.www.www.www.ww	MNWMMMMM	NWWWW	CF Step 2.7000000 MHz <u>Auto Mar</u>
Infinition <td>V1 S2 S3 FC AA</td> <td></td> <td></td> <td>N. Walker</td> <td>Freq Offset 0.00000000 Hz</td>	V1 S2 S3 FC AA			N. Walker	Freq Offset 0.00000000 Hz
Center 2.417 000 GHz Span 27 MHz #Pag RW 3 kHz #VRW 10 kHz Swoon 2.847 c (601 ptc)	¤(f): FTun Swp				Signal Track
#Res Day 5 KHZ # # V Day 10 KHZ 5 Weep 2.047 S (001 pts)	Center 2.417 000 GHz #Res BW 3 kHz	#VBW 10	kHz Swee	Span 27 p 2.847 s (601 pts	MHz [°] ts)



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PSD, C	hain 1 	HIGH C	H (245	7)			5	х	Freq/Channel
Ref 30 dBi #Peak	m :	#Atten 30 dE	3			Mkr1 2.	449 530 -12.44	GHz dBm	Center Freq 2.45700000 GHz
Log 10 dB/ Offst									Start Freq 2.44350000 GHz
14.9 dB DI		1							Stop Freq 2.47050000 GHz
8.0 dBm LgAv	/**	1. MWWWM	whiteman	NWWW	mmini	uwww	M		CF Step 2.70000000 MHz <u>Auto Man</u>
V1 S2 S3 FC AA	www						N. M	Max .	Freq Offset 0.00000000 Hz
¤(f): ₩M FTun Swp —								ЧМ _Р	Signal Track On <u>Off</u>
Center 2.4 #Res BW 3	57 000 GHz 3 kHz		#VBW 10 I	kHz	Swee	p 2.847	Span 2 s (601	27 MHz [°] pts)	
Copyright 2	2000-2011 Ag	gilent Techno	logies						



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8.3.6. OUT-OF-BAND EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

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IN-BAND REFERENCE LEVEL, Chain 0



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REPORT NO: 13U14995-1 FCC ID: PPD-QCA6234 OUT-OF-BAND EMISSIONS, Chain 0





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